

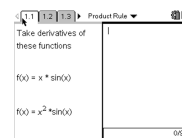
7. $x = \frac{1}{3}$ $x = 1$
 $y = \frac{31}{27}$ $y = 1$

37. eqn of line \perp to $y = x^3 - 3x + 1$
 at $(2, 3)$

Sep 9-9:00 AM

3.3b Rules for Differentiation

Use Product Rules to discover the rule for taking derivatives of products of functions.



Product $\frac{d}{dx}(x^2 \sin x)$

$\frac{d}{dx}(x^2 \sin x) = x^2 \cos x + 2x \sin x$

$\frac{d}{dx}(uv) = u \frac{dv}{dx} + v \frac{du}{dx}$

Sep 11-10:09 PM

Take the derivative of $y = (x^2 + 1)(x^3 + 3)$

$\frac{dy}{dx} = (x^2 + 1)(3x^2) + (x^3 + 3)(2x)$

$\frac{d}{dx}(\sin x \cos x) = (\sin x)(-\sin x) + \cos x \cdot \cos x$
 $= -\sin^2 x + \cos^2 x$
 $= \cos^2 x - \sin^2 x$

Sep 11-10:12 PM

The Quotient Rule

$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$

Differentiate $f(x) = \frac{x^2 - 1}{x^2 + 1}$

$f'(x) = \frac{(x^2 + 1)(2x) - (x^2 - 1)(2x)}{(x^2 + 1)^2}$

Sep 11-10:13 PM

Power rule for negative integer powers of x

$$y = \frac{1}{x} ; y' = \frac{x \cdot 0 - 1 \cdot 1}{x^2} = -\frac{1}{x^2}$$

$$y = x^{-1} ; y' = -1 \cdot x^{-2} = -\frac{1}{x^2}$$

Sep 11-10:16 PM

Find an equation for the line tangent to the curve $y = \frac{x^2 + 3}{2x}$ at $x=1$

$$y' = \frac{(2x)(2x) - (x^2 + 3) \cdot 2}{(2x)^2} \bigg|_{x=1} = \frac{4 - 4 \cdot 2}{4} = -1$$

$$y = -1(x - 1) + 2$$

Sep 11-10:17 PM

Example 9 p 123

T

orchard: 200 trees ; each tree 15 bu

Increase in
trees 15 $\frac{\text{trees}}{\text{yr}}$ yield = 15 $\frac{\text{bu}}{\text{tree}}$

Increase in yield

1.2 $\frac{\text{bu}}{\text{tree}}$

Total Production

$$P = T \cdot Y$$

$$P' = T \cdot Y' + Y \cdot T' = 200 \cdot 1.2 + 15 \cdot 15$$

$$\text{Increase in production} = 200 \text{ trees} \cdot 1.2 \frac{\text{bu}}{\text{tree}} + 15 \frac{\text{bu}}{\text{tree}} \cdot 15 \frac{\text{trees}}{\text{yr}}$$

Sep 11-10:19 PM